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Changes to the RUC Analysis on 7 April 1999

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This regards a small but very significant bug fix made to the RUC for the 1200 UTC run on 7 April 1999. Significant-level temperature and dew-point rawinsonde data had not been getting assimilated into the RUC analysis. Instead, linearly interpolated values of temperature and dewpoint temperature between mandatory levels from rawinsondes were being assimilated. This bug was related to a different order of rawinsonde data at NCEP vs. that at FSL, where the code was developed. The bug did not affect assimilation of significant-level wind data, which had been used correctly. ACARS data and other data sets also had been used correctly.

The fix was made just by commenting out half a line of code, but the effect has been quite pronounced. The sounding structures in the RUC are now sharply improved in situations when there are stability structures defined largely by significant-level data. An example is shown in Figures 1-3.   A typical problematic RUC grid-point sounding is shown in Fig. 1 (Del Rio, TX 1200 UTC 31 March 1999). With the bug fig, the grid-point sounding (Fig. 2) much more closely resembles the observed sounding (Fig. 3). In cases where the sounding structure is smoother or if inflection points happen to occur at mandatory levels, the effect of the change is much smaller.

The fix has resulted in a major change in convective inhibition (CIN), some change in CAPE, some change in precipitation (not removing thinner saturated layers now), and the overall performance of RUC 12-h forecasts in verification against rawinsondes made a significant improvement after the fix. A major factor in this overall improvement seems to be a better fit to rawinsonde heights from using the significant-level temps and improved wind/mass balance in the analysis.

Acknowledgment: Phillip Bothwell of the NCEP Storm Prediction Center noticed the original problem and helped in verifying the solution.
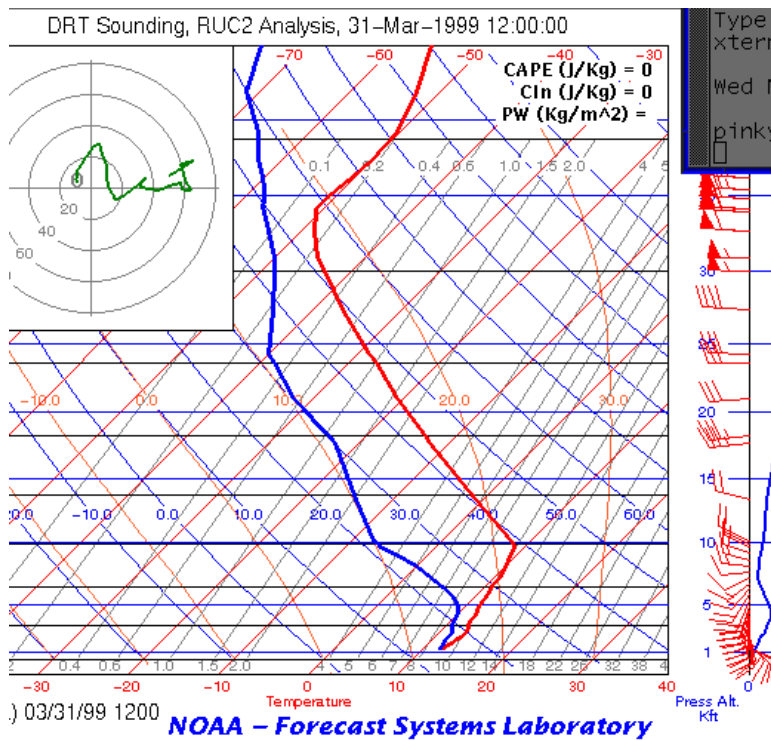
Figure 1. **RUC2 grid-point sounding at Del Rio, TX for 1200 UTC 31 Mar 1999. This shows the erroneous structure without significant-level data and with linearly interpolated values between mandatory levels.**
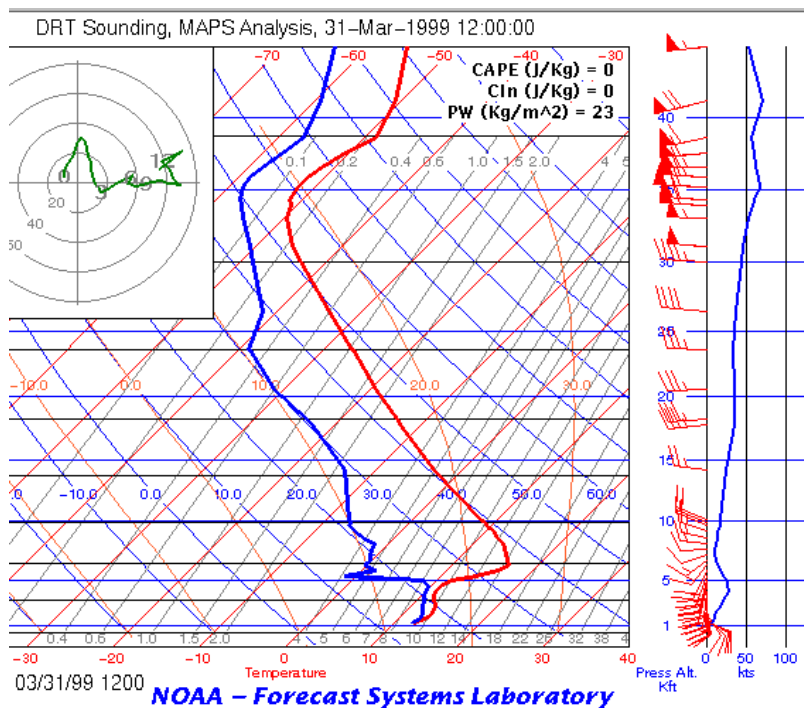

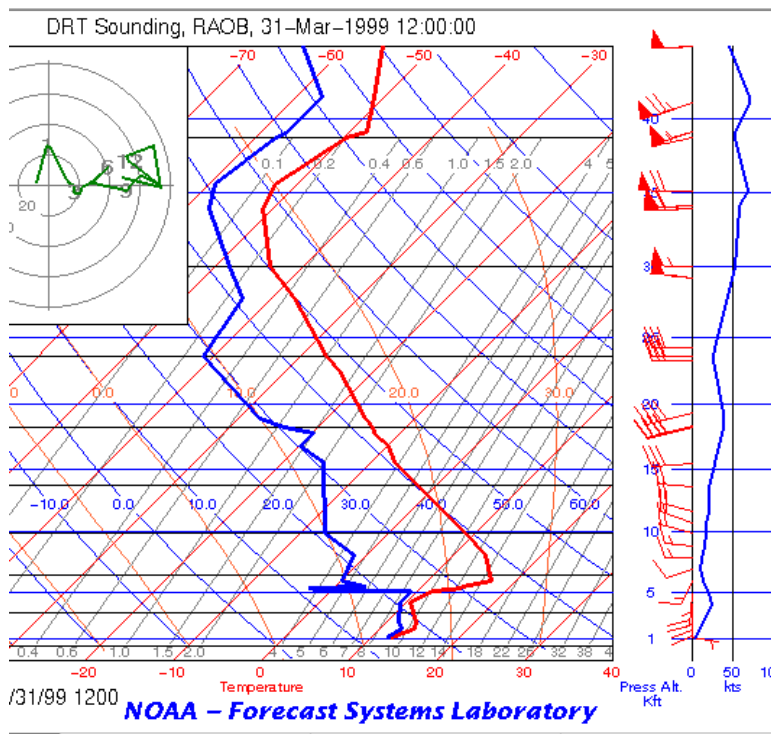**Figure 2.** **Corrected RUC-2 grid-point sounding with bug fix in analysis, same as Fig. 1 otherwise.**

Figure 3. Rawinsonde observation for Del Rio, TX, 1200 UTC 31 Mar 1999.